

CLAIMS

1. A fastening structure in which a first member and a second member are mutually connected by a fastening member including a threaded portion, wherein

5 the first member is formed with a tubular projecting portion which raises from one surface of the first member toward the second member and inwardly defines a hollow portion,

the second member is formed with a hole in which the tubular projecting portion is inserted,

10 the threaded portion of the fastening member includes an outer diameter larger than a minimum inside diameter of the hollow portion of the tubular projecting portion and smaller than a hole diameter of the second member,

the threaded portion is screwed into the hollow portion of the tubular projecting portion inserted into the hole of the second member,

15 the tubular projecting portion is formed with a radially expanded portion by expanding the tubular projecting portion radially and outwardly by screwing the threaded portion, and

the first member and the second member are mutually fastened in a state where an outer circumference surface of the radially expanded portion abuts on a peripheral wall of the hole of the second member.

2. The fastening structure according to claim 1, wherein the hollow portion defined by the tubular projecting portion is a hollow portion whose both ends are open, penetrating the first member in its through-thickness direction.

3. The fastening structure according to claim 2, wherein at least one slit is formed from a leading end of the tubular projecting portion toward a base end thereof.

5 4. The fastening structure according to claim 3, wherein the slit extends from the base end of the tubular projecting portion to the one surface of the first member.

10 5. The fastening structure according to claim 2, wherein the radially expanded portion of the first member is pressed onto the peripheral wall of the hole of the second member without remaining a space between the radially expanded portion and the peripheral wall of the hole of the second member.

15 6. The fastening structure according to claim 2, wherein a base end portion of the tubular projecting portion of the first member is formed with a recess portion for controlling increase of torque required for screwing the fastening member.

20 7. The fastening structure according to claim 6, wherein the recess portion is defined by a radially increased portion of an inside diameter of the tubular projecting portion.

25 8. The fastening structure according to claim 7, wherein the radially increased portion includes a uniform bore diameter in an axis line direction of the tubular projecting portion.

9. The fastening structure according to claim 2, wherein a leading end of the tubular projecting portion is located in the hole of the second member and does not project from an other surface of the second member located in an opposite side of one surface of the second member facing to the one surface of the first member.

10. The fastening structure according to claim 2, wherein a leading end of the tubular projecting portion projects to an outward of the second member from an other surface of the second member located in an opposite side of one surface of the second member facing to the one surface of the first member, and an outer diameter in the projecting portion is larger than a bore diameter of the hole of the second member.

11. The fastening structure according to claim 2, wherein the fastening member includes a flange portion at one end of the threaded portion, the threaded portion is screwed into the tubular projecting portion from a leading end of the tubular projecting portion such that the flange portion is located in an other surface side of the second member located in an opposite side of one surface of the second member facing to the one surface of the first member, and the second member is whereby sandwiched between the flange portion of the fastening member and the one surface of the first member.

12. The fastening structure according to claim 11, wherein the leading end of the tubular projecting portion projects to an outward of the second member from the other surface of the second member, an outer diameter in the projecting portion is larger than a bore diameter of

the hole of the second member, and the projecting portion is sandwiched between the flange portion and the other surface of the second member.

13. The fastening structure according to claim 11, wherein the leading end of the tubular projecting portion projects to an outward of the second member from the other surface of the second member, an outer diameter in the projecting portion is larger than a bore diameter of the hole of the second member, and the flange portion is formed with a concave portion for accepting the projecting portion of the tubular projecting portion.

14. The fastening structure according to claim 13, wherein a closed space is formed by the concave portion of the flange portion and the other surface of the second member on which the flange portion abuts.

15. A fastening member used for the fastening structure according to claim 2, wherein the threaded portion is formed by at least two kinds of thread shapes.

16. The fastening member according to claim 15, wherein a portion including one of the thread shapes mainly has a function for tapping the tubular projecting portion, and a portion including the other of the thread shapes mainly has a function for deforming the tubular projecting portion radially and outwardly.

17. The fastening member according to claim 15, wherein one of the thread shapes is an incomplete thread shape.

18. The fastening member according to claim 15, wherein the fastening member includes a flange portion at one end of the threaded portion, and an outer diameter of screw in a portion adjacent to the flange portion of the threaded portion is larger than an outer diameter of screw in a portion remote from the flange portion.

19. The fastening member according to claim 15, wherein a pitch in a portion adjacent to the flange portion of the threaded portion and a pitch in a portion remote from the flange portion are provided with mutual phase lag.

20. A fastening method for mutually fastening a first member and a second member, comprising the steps of:

15 forming a hole to the second member;
 forming a tubular projecting portion to the first member;
 inserting the tubular projecting portion into the hole;
 screwing a fastening member having a threaded portion larger than a minimum inside diameter of the tubular projecting portion and
20 smaller than a hole diameter of the second member into the tubular projecting portion in the inserted state in an axis line direction of the tubular projecting portion; and
 pressing an outer circumference surface of the tubular projecting portion onto a peripheral wall of the hole of the second member by
25 radially expanding the tubular projecting portion to expand radially and outwardly by screwing the fastening member into the tubular projecting portion.

21. The fastening method according to claim 20, wherein the tubular projecting portion is formed by a burring processing.

5 22. An image forming apparatus comprising the fastening structure according to claim 1 to a fastening part.

23. An image forming apparatus comprising the fastening member according to claim 15 to a fastening part.